XML Syntax for Clinical Laboratory Procedure Manuals

Gilan Saadawi, MD, PhD, and James H. Harrison, Jr., MD. PhD
Department of Pathology and Center for Biomedical Informatics
University of Pittsburgh School of Medicine

Abstract: We have developed a document type description (DTD) in Extensable Markup Language (XML)[1] for clinical laboratory procedures. Our XML syntax can adequately structure a variety of procedure types across different laboratories and is compatible with current procedure standards. The combination of this format with an XML content management system and appropriate style sheets will allow efficient procedure maintenance, distributed access, customized display and effective searching across a large body of test information.

Background: Formal clinical laboratory procedures are standardized documents that support the uniform performance of testing, specimen handling and equipment maintenance by laboratory personnel. Procedure manuals are written, authenticated, and reviewed by authorized personnel as a requirement for laboratory accreditation. The manuals are typically maintained as word processor files in a format similar to that specified by the National Committee of Clinical Laboratory Standards' (NCCLS)[2], and are printed on paper for daily use and periodic review. Large laboratories may support thousands of procedures at multiple sites.

Typical paper-based manuals require sizeable storage space, are inefficient to use and search, and are difficult to review and update. If similar laboratory testing is performed at multiple sites, the manuals and other test information must be physically duplicated across the sites. Keeping a large, dispersed set of manuals current and synchronous is challenging. To address these problems, we have developed an XML syntax for structuring clinical laboratory procedures as a first step in the development of an electronic management system for clinical laboratory procedures.

Methods: A representative set of clinical laboratory procedures from laboratories in the Presbyterian and Shadyside Hospitals (University of Pittsburgh Medical Center) were analyzed to create an initial DTD. This DTD was used to structure an additional set of procedures, which were reviewed by laboratory personnel to develop the final DTD. This DTD is compatible with current NCCLS procedure guidelines

Results: Our XML syntax includes 86 elements (tags) and it can adequately structure a variety of procedure types across different laboratories. The DTD extends the previous NCCLS standard format to include information for physicians and patients. Detailed markup is optional; our DTD is compatible with the HL7 Clinical Document Architecture and would logically be used at levels two and three of that markup framework. [3] Our implementation of XML linking and signatures allows a procedure to have multiple components that are authored at different times by different parties and are authenticated together as a unit. We expect this format to be useful in authoring, distributing and managing laboratory procedures within standard XML publishing systems.

References:

1.World Wide Web Consortium (W3C). Extensible Markup Language (XML) 1.0 Recommendation 6 October 2000. Available at: http://www.w3.org/TR/2000/REC-xml-2000

2. National Committee for Clinical Laboratory Standards (NCCLS). Available at: http://www.nccls.org/.

3.Dolin RH, Alschuler L, Beebe C, Biron PV, Boyer SL, Essin D, et al. The HL7 Clinical Document Architecture. J Am Med Inform Assoc 2001;8(6):552-69.